INSTITUTE OF NUCLEAR SCIENCES

Prof. Dr. Meral ERAL
DIRECTOR

INSTITUTE OF NUCLEAR SCIENCES

- MISSION: Our mission is to provide graduate level of education and research opportunities for the benefit of humankind and society. Along with that, we also target to expand number of experts in the field of nuclear sciences by following up with the advances in technology, and by the development of new techniques and methodologies.

- VISION: To became the leading institute in nuclear sciences in Turkey. With the establishment of chain laboratories at the service of regional and national agencies, the Institute of Nuclear Sciences targets to enhance its competence in the field internationally.

Institutional Development

The foundation of the Institute of Nuclear Sciences at Ege University dates back to 1960s.

- 1966 - 1977: Radioisotope Research Center
- 1977 - 1982: Institute of Nuclear Research and Education
- 1983: Establishment of Institute of Nuclear Sciences

This year, we are celebrating our 25th anniversary.

at present,

- 36 academic staff , 12 administration staff, 77 Student
- Since 1986, awarded MSc-157 and PhD-40 degrees

Institutional Development

- Institute comprises of three main departments

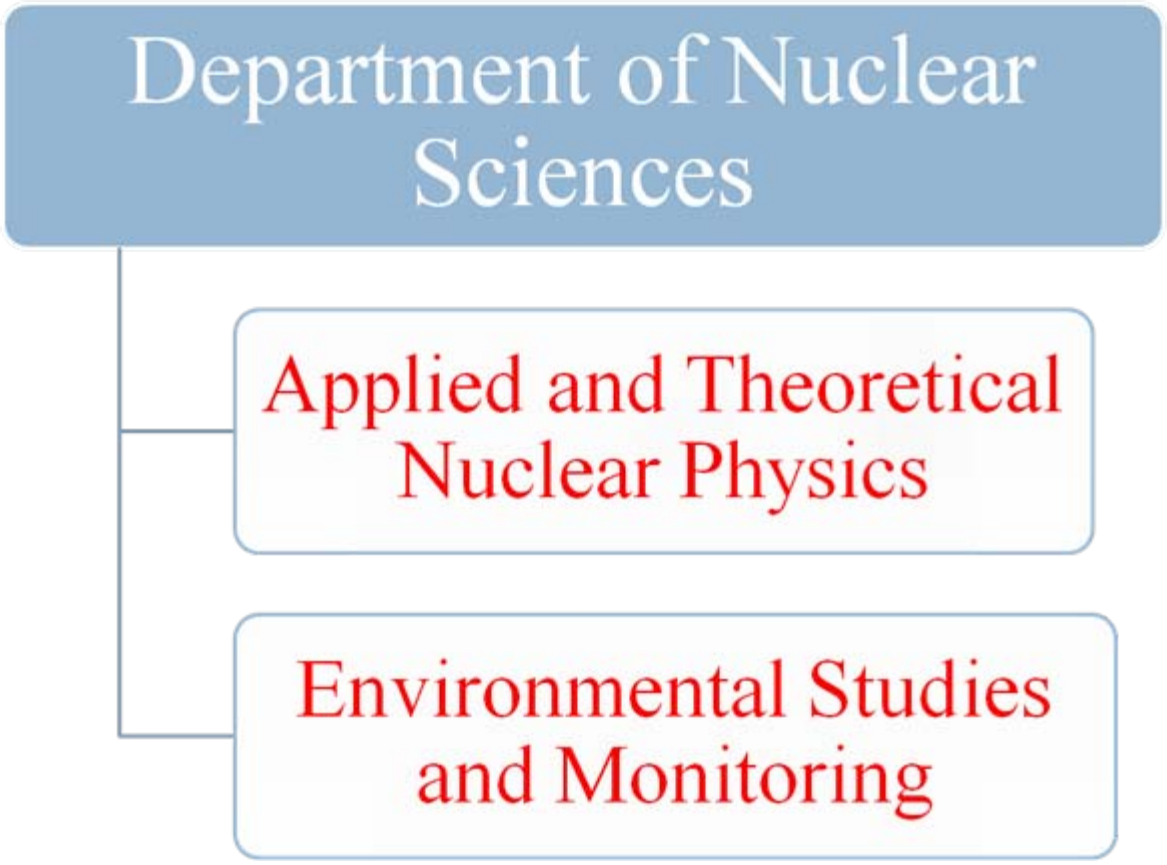
- Department of Nuclear Sciences
- Department of Nuclear Technology
- Department of Nuclear Applications

Purposes

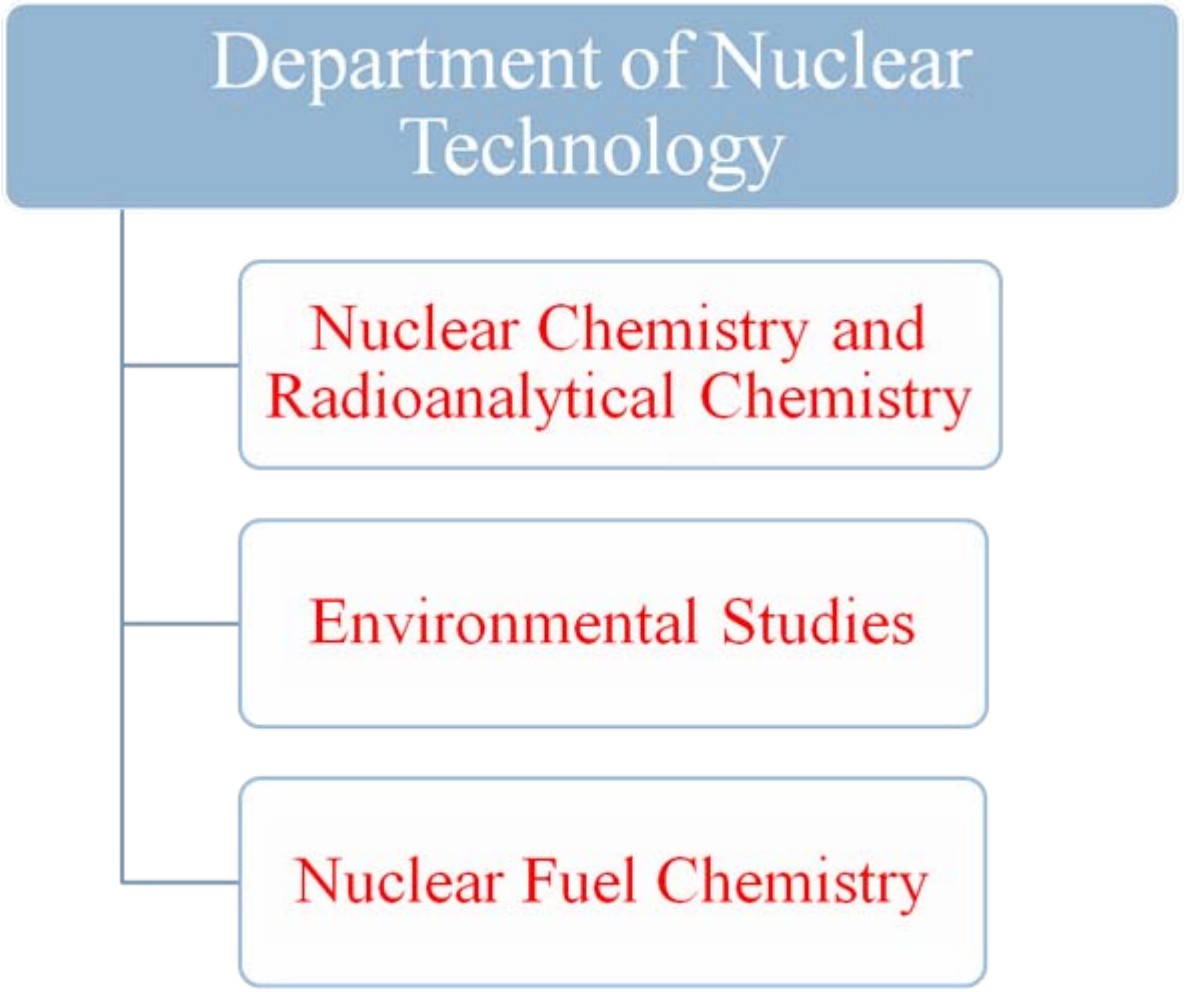
Due to the interdisciplinary nature of nuclear science, the education and the research activities of the three Departments cover several fields.

- nuclear physics
- nuclear chemistry
- nuclear electronics
- nuclear fuel technology
- health physics
- nuclear spectroscopy
- radioanalytical chemistry
- radiopharmacy
- radiobiology
- radiation dosimetry

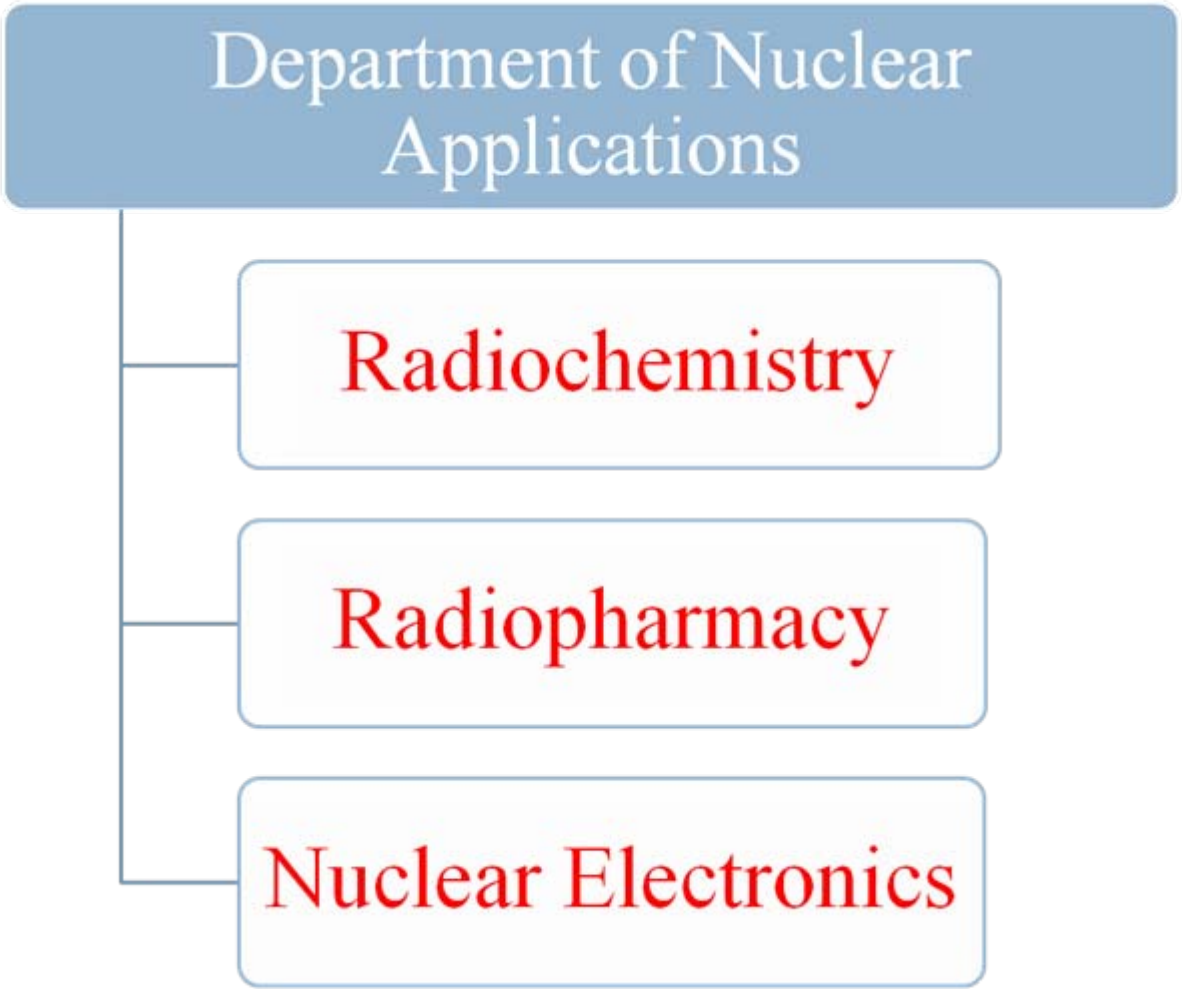
Main Topics of the Departments

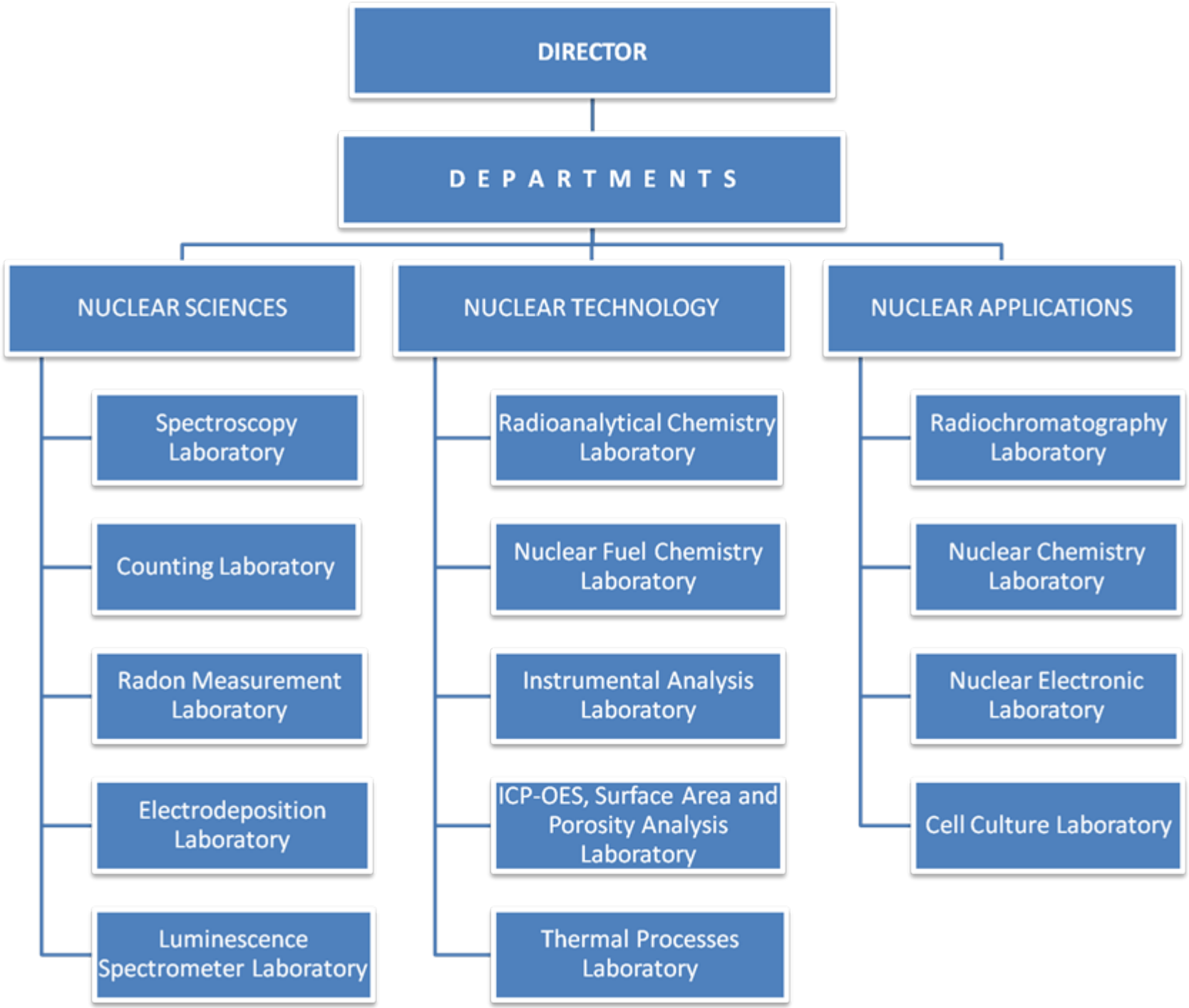


Main Topics of the Departments



Main Topics of the Departments




DIRECTOR
DEPARTMENTS
NUCLEAR SCIENCES
NUCLEAR TECHNOLOGY
NUCLEAR APPLICATIONS
Spectroscopy Laboratory
Counting Laboratory
Radon Measurement Laboratory
Electrodeposition Laboratory
Luminescence Spectrometer Laboratory
Radioanalytical Chemistry Laboratory
Nuclear Fuel Chemistry Laboratory
Instrumental Analysis Laboratory
ICP-OES, Surface Area and Porosity Analysis Laboratory
Thermal Processes Laboratory
Radiochromatography Laboratory
Nuclear Chemistry Laboratory
Nuclear Electronic Laboratory
Cell Culture Laboratory

RESEARCH INTERESTS

- Determination of natural and artificial radionuclides in environmental samples using different methods
- Measurement of indoor and outdoor radon concentrations
- Use of different nuclear techniques in several fields (prediction of earthquakes, determination of sedimentation rates in the sea and lake sediments, erosion rates, trace element analysis etc.)
- Development of nuclear spectroscopic techniques and the radiation counting systems
- Recovery of some radionuclides using natural and synthetic adsorbents, synthesis of new selective adsorbents
- Recovery, concentration and purification of uranium and thorium from ore or different sources
- Preparation and characterization of nuclear fuel compounds

RESEARCH INTERESTS

- Studies on determination and recovery of rare earth elements by chromatographic methods
- Design and synthesis of radiopharmaceuticals labelled with radioactive iodine or Tc-99m, determination of their radiopharmaceutical potentials
- Thermoluminescence (TL), application of TL dosimeters, TL mechanism of dosimeter, luminescence dating
- Microdosimetry and dosimetry of radionuclides used in nuclear medicine
- Actinide complexes and calculation of their stability constants
- Nuclear imaging

LABORATORIES

- Nuclear Spectroscopy Laboratory
- Instrumental Analysis Laboratory
- Radiation Counting Laboratory
- Radium-Radon Laboratory
- Radioanalytical Chemistry Laboratory
- Nuclear Electronic Laboratory
- Nuclear Fuel Laboratory
- Nuclear Chemistry Laboratory
- Deposition Laboratory
- Radiochromatography Laboratory
- ICP - OES, Surface Area and Porosity Analysis Laboratory
- Luminescence Spectrometer Laboratory
- Thermal Processes Laboratory
- Deionised Water Producing Laboratory
- Cell Culture Laboratory

Nuclear Spectroscopy Laboratory

- Distribution of natural and antropogenic radionuclides in the atmosphere, terrestrial and marine ecosystems
- Monitoring of natural radionuclide flux periodically
- Determination of soil erosion rates

- Dating of sea and lake sediments
- Monitoring of the environmental radioactive contaminations using bioindicators and biomonitors
- Development of nuclear techniques

Instrumental Analysis Laboratory

- Spectrophotometric, gross alpha and gross beta analysis of several samples
- Determination of uranium in the various natural water samples
- Determination of element concentrations by potentiometric methods using titroprocessor and dosimat system

Radiation Counting Laboratory

- Natural and artifical radiation analysis of industrial, environmental samples and foods in İzmir and its around

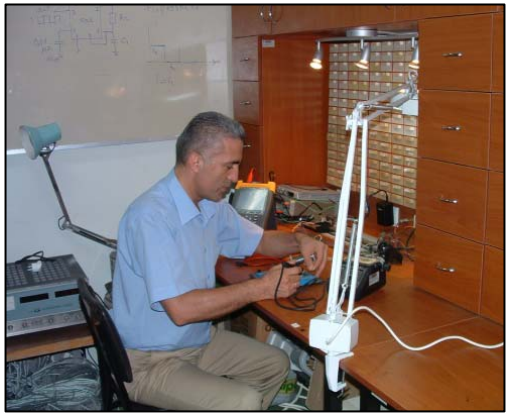
Radium-Radon Laboratory

- Radon - radium researches in natural waters, drinking waters, raw-waste waters and environmental samples
- Determination of radon activity concentrations in air and soil samples
- Studies with radon movement from soil for predicting the earthquakes
- Studies on relationship between eartquakes and radon gas concentrations relevant with alpha number

Radioanalytical Chemistry Laboratory

- Using of several separation techniques for concentrating and recovering of some radionuclides
- Investigation of adsorption behaviors and thermodynamic properties of some radionuclides in aqueous solutions using by natural, synthetic and biological adsorbents and characterization of adsorbents
- Determination of several radionuclides in environmental samples using the radioanalytical techniques such as gross radium isotopes analysis, gross alpha and gross beta analysis
- Many research projects on environmental radioactivity

Nuclear Electronic Laboratory



- Designing, maintaining and troubleshooting of nuclear spectroscopy systems
- Designing of microprocessor controlled radiation detection systems and dose measurement systems

Nuclear Fuel Laboratory

- Obtaining of uranium and thorium from ore or several sources concentration and purification studies
- Preparing of nuclear fuel compounds and their characterization
- Synthesis of new type adsorbents, removal of radioactive elements from aqueous solutions using these adsorbents
- Dissolution of industrial, environmental and food samples by microwave digestion

Nuclear Chemistry Laboratory

- Designing , synthesizing and quality controls of radiopharmaceuticals labelled with I-125, I-131, Tc-99m ve Re-186/188 (amino acids, peptides, bacteria, drugs, hormones, vitamine, antibiotics, antidepressant and magnetic particles)
- Trace element determination using isotope dilution analysis and waste management of I-131 from hospital wastes

Deposition Laboratory

- Deposition and radiochemical seperation studies to trace the distrubution of natural radionuclides sources in terrestial and aquatic ecosystems

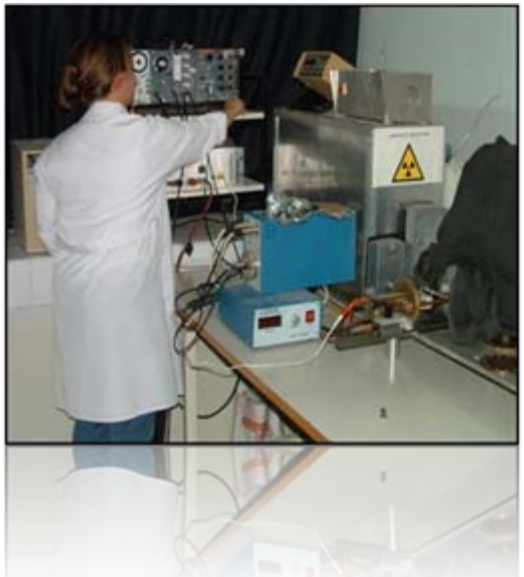
Radiochromatography Laboratory

- The qualitative and quantitative determinations of new designed radiopharmaceuticals using HPLC.

ICP – OES, Surface Area and Porosity Analysis Laboratory

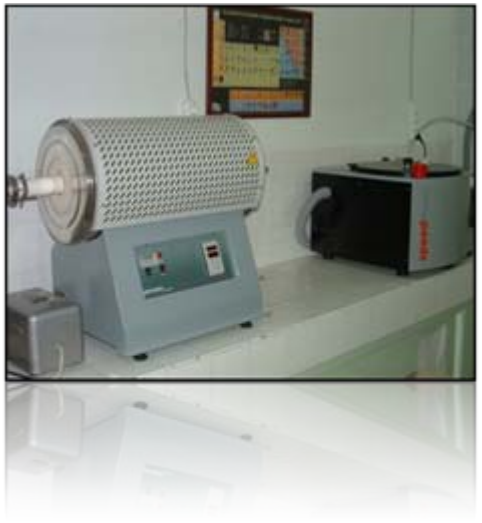
- Analyzing simultaneously approximately 70 chemical elements at trace, minor, major concentration levels by ICP-OES
- Surface area, porosity and pore distribution analysis of solid samples

Luminescence Spectrometer Laboratory



- Investigation of the luminescence spectrum of various solid materials
- Thermoluminescence and optically stimulated luminescence measurements
- Measurement of thermoluminescence dosimeters (TLD) and the characterization researches
- Dating studies

Thermal Processes Laboratory



- Thermal treatment laboratory consists of systems and instruments for synthesis, separation and drying processes
- Thermostatically controlled shaker, centrifuge, vacuum oven and rotaryevaporator are used for general chemical treatments
- High temperature furnace is used for annealing of dosimetric materials and synthesis of adsorbents in the calcination step

Deionised Water Producing Laboratory

- Pure and ultrapure water production at ASTM-1 Standards

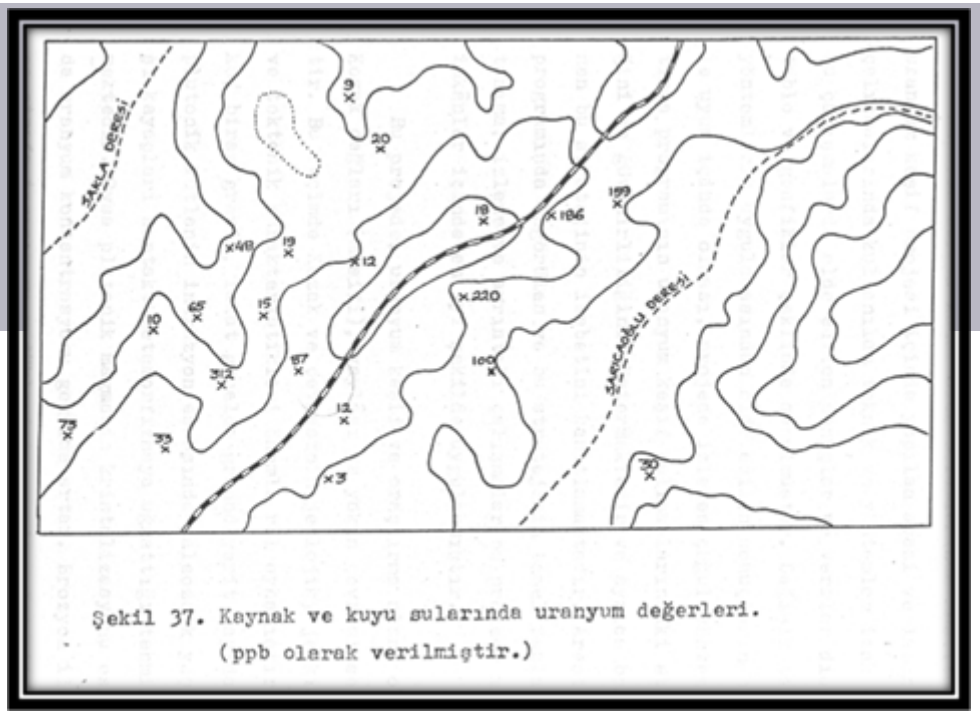
Cell Culture Laboratory

- In vitro studies of radiopharmaceuticals with normal and tumour cells by cell culture experiments
- Investigation of therapeutic effect of radiolabeled compounds on human cancer cells

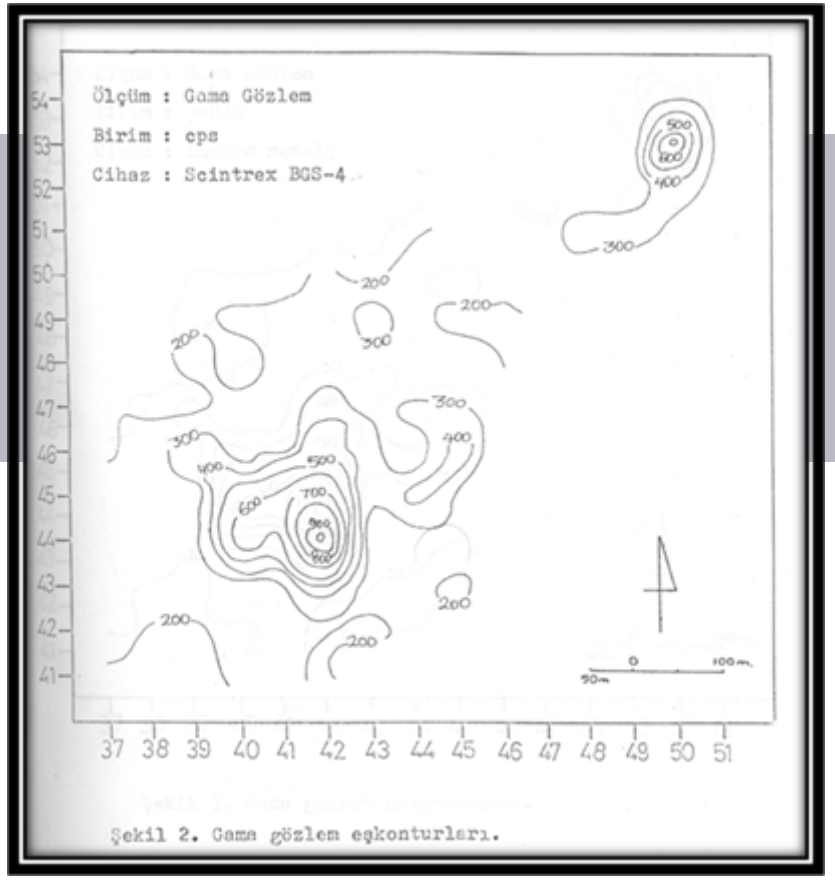
T.R. Prime Ministry State Planning Organization

SPO Supported, 1984

Sarıcaoğlu Region Uranium Investigation Project



Şekil 37. Kaynak ve kuyu sularında uranyum değerleri.
(ppb olarak verilmiştir.)



Şekil 2. Gama gözlem eşkonturları.

TUR – 8674/RB, 95 (IAEA)

Investigation of Correlation Between the Magnitude of the Earthquakes and Radon Concentrations in Soil Gas and Underground Water Along Gediz Fault in Western Anatolia

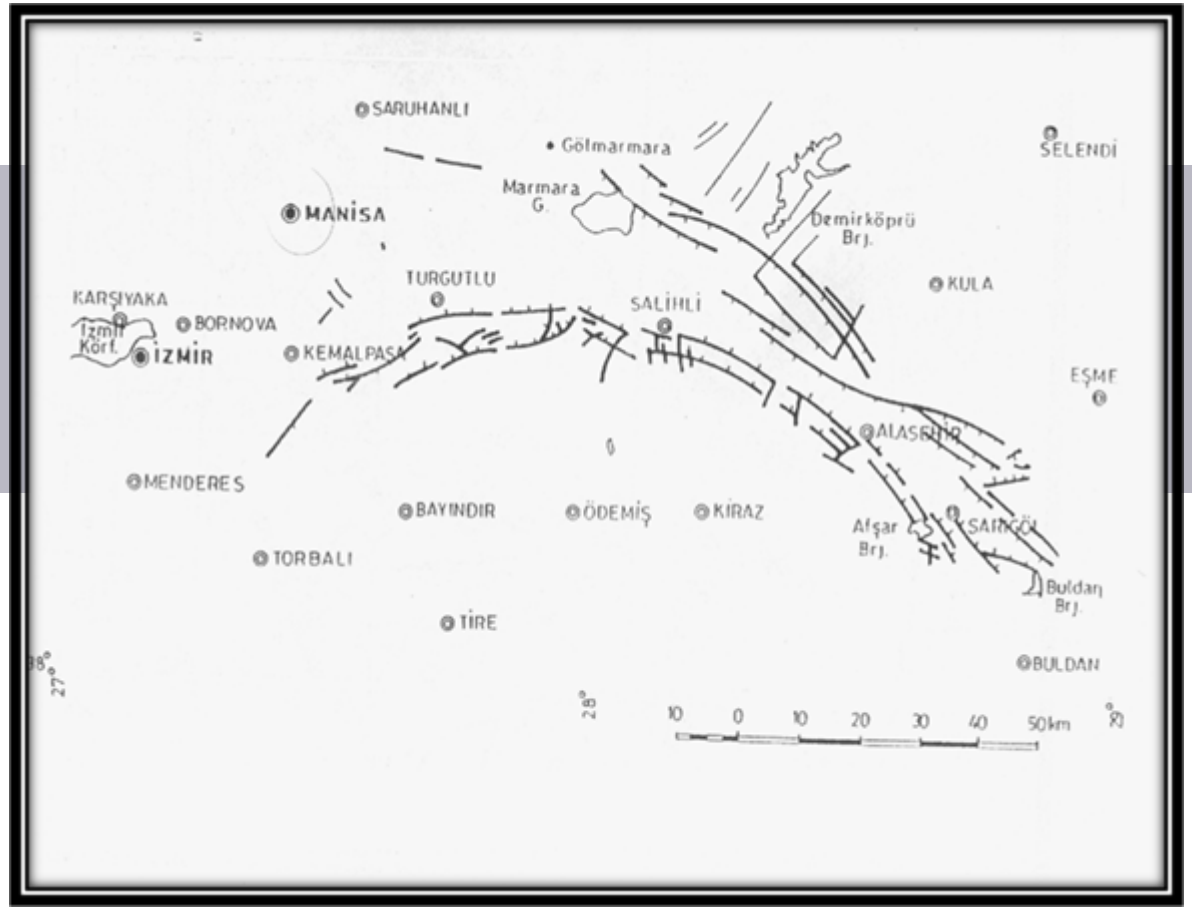


Figure 4. Radon measuring in soil gas by track etch detector

12641/RO/RBF, B5-TUR-31834 (IAEA)

^{210}Po and ^{210}Pb in Marine Ecosystem of Aegean Sea Turkish Coast

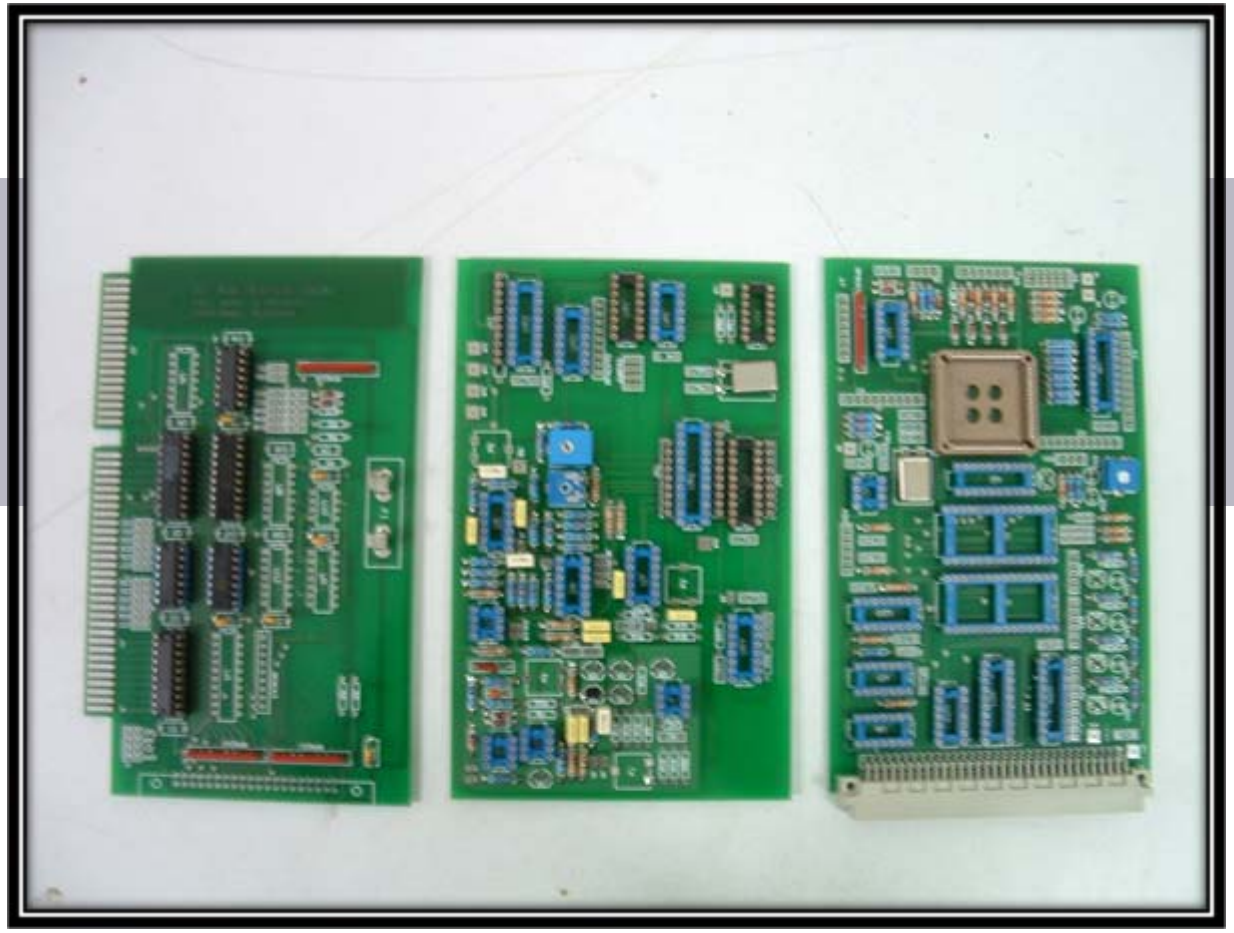
- TÜBİTAK (The Scientific and Technological Research Council of Turkey) 102Y096, 2003
- EBİLTEM (Ege University Science Technology Research and Application Center) 2003 BİL 012

  Researching of Geochemical Distribution of Radioactivity in the Van Lake and Van Lake Basin Surface Waters in the Aspect of Public Health
- ÇAYDAG-104Y072, 2005-2008

  Assesment of Van Lake in the aspect of radiological and hydrogeochemical risks

TUR – 9150, 96 (IAEA)

Development of Computer Based Troubleshooting Tools and Instruments

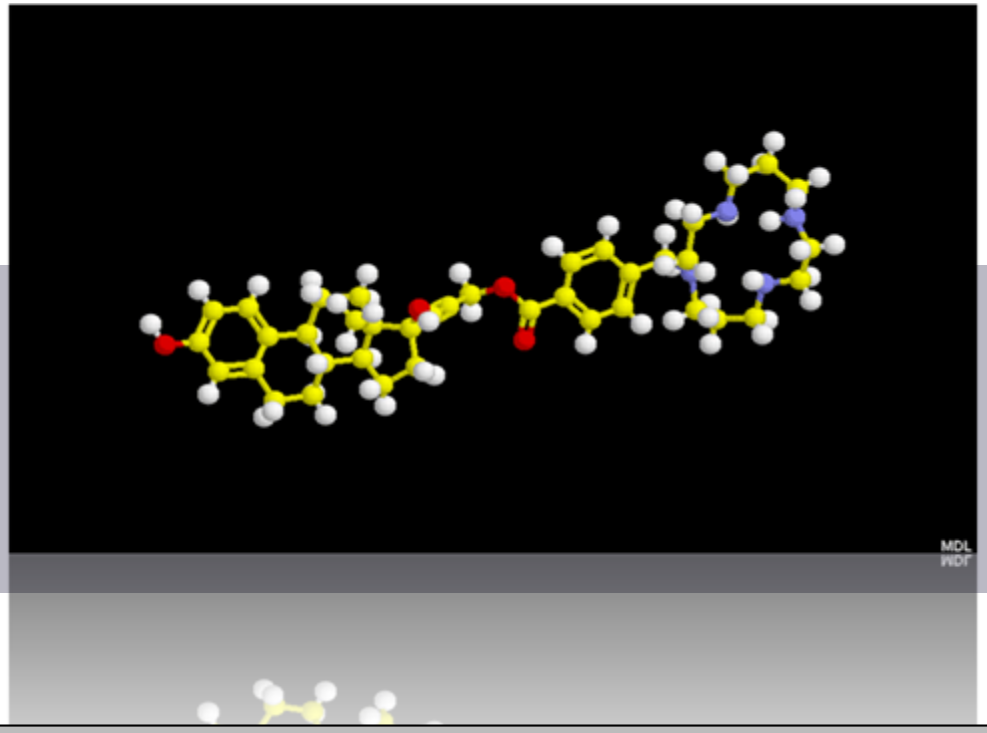


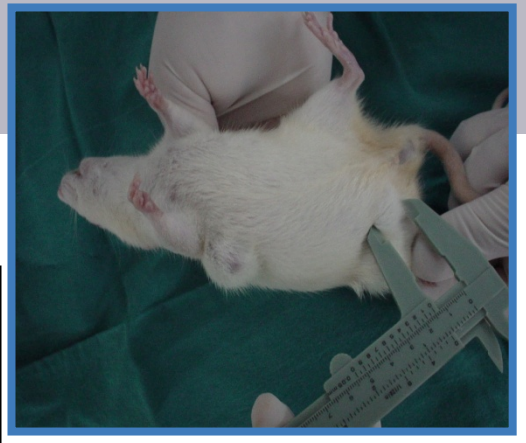
T.R. Prime Ministry State Planning Organization (SPO) Supported 98 DPT 014, 1998

Iodide Determination in Urine and Drinking Water Samples in Ege Region by Isotope Dilution Analyses

TUR – 28458, 2000 (IAEA)

Preparing of Estrogen – Derivate Compounds Labelled Tc-99m and Determination of Radiopharmaceutical Potential



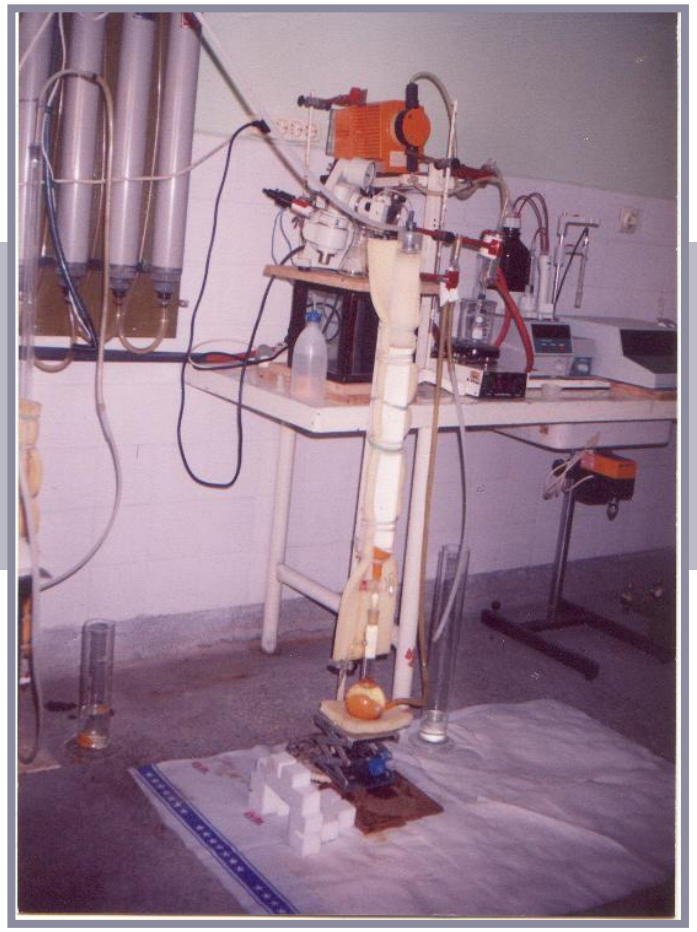


2003 K120400 - 06 DPT 006, 2006 (DPT)

A Project to Constitute of Research and Training Infrastructure Related to the Subject-Design of New Radiopharmaceuticals and Development and Investigation of their Radiopharmaceutical Potentials

Synthesis and Characterization Studies of Uranium dioxide, Thorium dioxide and Mixed oxides.

ThO_2 Spheres



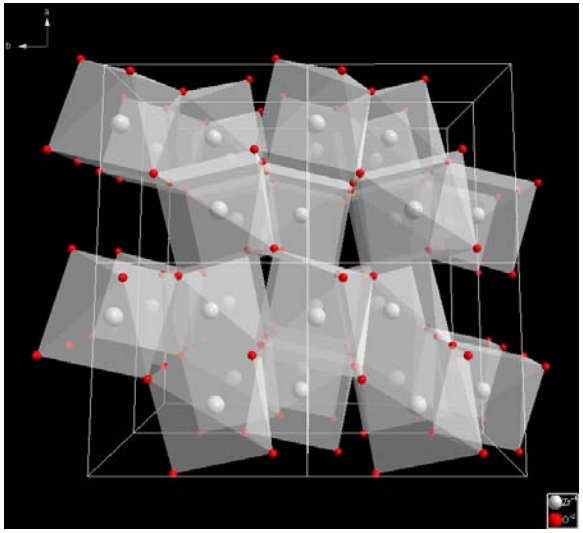
Sol-Gel System

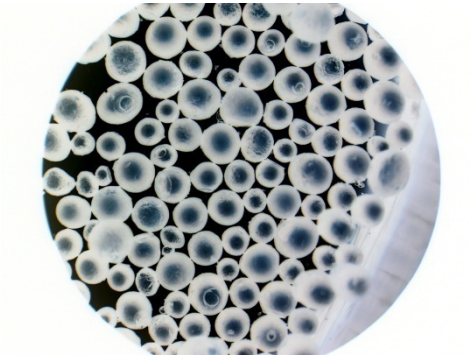
- Conventional Powder Metallurgy
- Co-precipitaion
- Microsphere production via Sol-Gel Route

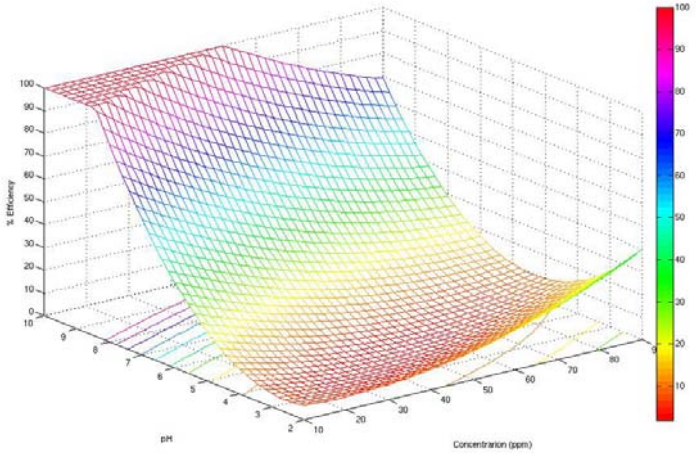
UO_2 Spheres

TBAG – 106T680, 2007 (TÜBİTAK)

Synthesis and Characterization of Novel Type of Composite Sorbent Spheres Produced by the Sol-Gel Method to Use in Nuclear Waste Management





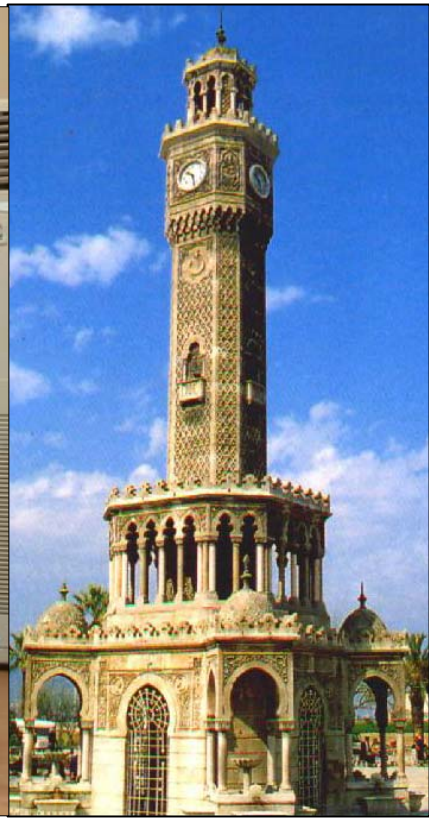


TBAG – 104T139, 2005 (TÜBİTAK)

Application of Environmental Radiation Measurements and Luminescence Techniques for Age Determination of Geological and Archeological Samples

Yeşilova Tumulus

Neolithic Age Archeological Samples



THANK YOU FOR YOUR ATTENTION